
फॉर्मोथियोन तकनीकी विलयन —
विशिष्टि
(पहला पुनरीक्षण)

Formothion Technical Solutions —
Specification
(First Revision)

ICS 65.100.10

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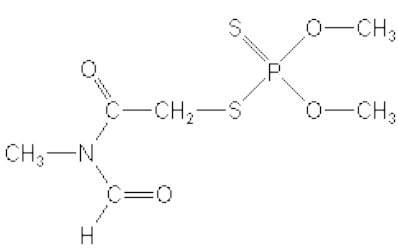
Price Group 5

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Pesticides Sectional Committee had been approved by the Food and Agriculture Divisional Council.

Formothion is a contact and systemic insecticide and acaricide and is used in controlling pests of agricultural crops.

Formothion is the common name accepted by the International Organization for Standardization (ISO) for *S*-(*N*-formyl-*N*-methyl-carbamoylmethyl) dimethyl phosphorothiolothionate. The empirical and structural formulae and molecular weight are as given below:

| <i>Empirical Formula</i> | <i>Structural Formula</i> | <i>Molecular Mass</i> |
|--------------------------|--|-----------------------|
| $C_6H_{12}NO_4PS_2$ |  | 257.0 |

Formothion is a very unstable compound. For this reason, even though a material of over 90 percent purity can be manufactured, it is commercially marketed containing 50 percent active ingredient at which level it is stabilized.

This standard was first published in 1976. In this revision, the standard has been brought out in the latest style and format of the Indian Standards. It also incorporates one amendment issued to this standard.

In the preparation of this standard due consideration has been given to the provisions of the *Insecticides Act*, 1968 and the rules framed thereunder. However, this standard is subject to the restrictions imposed under these, wherever applicable.

The composition of the committee responsible for the formulation of this standard is listed in Annex B.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard
FORMOTHION TECHNICAL SOLUTIONS – SPECIFICATION
(First Revision)

1 SCOPE

This standard prescribes the requirements and the methods of sampling and test for formothion technical solutions, employed in the preparation of different formulations.

2 REFERENCES

The standards, given below contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards.

| <i>IS No.</i> | <i>Title</i> |
|-------------------------|--|
| IS 1070 : 1992 | Reagent grade water — Specification (<i>third revision</i>) |
| IS 1260 (Part 1) : 1973 | Pictorial marking for handling |

*IS No.**Title*

| | |
|-------------------------|---|
| | and labelling of goods: Part 1 Dangerous goods |
| IS 6940 : 1982 | Methods of test for pesticides and their formulations (<i>first revision</i>) |
| IS 8190 (Part 2) : 1988 | Requirements for packing of pesticides: Part 2 Liquid pesticides (<i>second revision</i>) |
| IS 10946 : 1996 | Methods of sampling for technical grade pesticides |

3 REQUIREMENTS**3.1 Description**

The material consisting, essentially, of a solution of formothion in an organic solvent shall be in the form of a dark brown, clear liquid, free from extraneous impurities.

3.2 The material shall comply with the requirements as specified in Table 1.

Table 1 Requirements for Formothion Technical Solution
(Clause 3.2)

| Sl No. | Characteristic | Requirement | Method of Test, Refer to |
|--------|---|-------------|--------------------------|
| (1) | (2) | (3) | (4) |
| i) | Formothion content, percent by mass, <i>Min</i> | 50.0 | Annex A |
| ii) | Specific Gravity 27/27 °C, <i>Min</i> | 1.05 | IS 6940 |
| iii) | Water content, percent by mass, <i>Max</i> | 0.1 | IS 6940 |
| iv) | Material insoluble in acetone, percent by mass, <i>Max</i> | 0.1 | IS 6940 |
| v) | Acidity (as H ₂ SO ₄), percent by mass, <i>Max</i> | 3.0 | IS 6940 |

4 PACKING

The material shall be packed as per the requirement given in IS 8190 (Part 2).

5 MARKING

5.1 The containers shall be securely closed and shall bear legibly and indelibly the following information:

- a) Name of the material;
- b) Name and address of the manufacturer;

- c) Batch number;
- d) Date of manufacture;
- e) Date of expiry;
- f) Net quantity;
- g) Nominal nickel content, percent (*m/m*);
- h) Cautionary notice as worded in the *Insecticides Act*, 1968, and rules framed thereunder; and
- j) Any other information required under the *Legal Metrology (Packaged Commodities) Rules*, 2011.

In addition to the above, the containers shall also be marked with the symbol for danger of poisoning as specified in IS 1260 (Part 1).

5.2 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act, 2016* and the Rules and Regulations framed thereunder, and the products may be marked with the Standard Mark.

6 SAMPLING

Representative sample of the material shall be drawn

according to IS 10946.

7 TESTS

7.1 Tests shall be carried out as by the methods referred to in col 4 and 5 of Table 1.

7.2 Quality of Reagents

Unless specified otherwise, pure chemicals and distilled water (*see* IS 1070) shall be employed in tests.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

ANNEX A

[Table 1, Sl No. i)]

DETERMINATION OF FORMOTHION CONTENT

A-1 PRINCIPLE

The method is based on hydrolysis of formothion to methylamine, distillation of the latter into a known excess of standard hydrochloric acid and back titration of the excess with alkali.

A-2 REAGENTS

A-2.1 Glycerine — 50 percent (v/v), diluted with water.

A-2.2 Methyl Red Indicator Solution — Aqueous, 1 percent (m/v).

A-2.3 Sodium Hydroxide Solution — 40 percent (m/m).

A-2.4 Standard Hydrochloric Acid Solution — 0.1 N.

A-2.5 Standard Sodium Hydroxide Solution — 0.1 N.

A-3 APPARATUS

A recommended assembly of apparatus is shown in Fig. 1.

A-4 PROCEDURE**A-4.1 Hydrolysis**

Weigh accurately a sufficient amount of the sample in a small glass ampoule to contain approximately 500 mg of formothion and introduce it into a 500 ml reaction flask. Add 2 glass beads and fix the flask to the equipment as indicated in Fig. 1.

A-4.1.1 Dip the discharge tube into the 250 ml beaker (narrow form), containing exactly 40 ml of standard hydrochloric acid solution. Start cooling water in both the condensers. Each condenser should have a separate water supply. It should be ensured that all joints of the equipment are tight.

A-4.1.2 With the help of a funnel, add through the thermometer opening 200 ml of diluted glycerine and 40 ml of standard sodium hydroxide solution. Close immediately the opening with the thermometer and heat gently to boiling in an oil-bath maintained at 140 °C to 150 °C. The temperature of the reaction solution will be 108 °C to 109 °C. Continue heating under reflux for 20 minutes in order to complete the 'hydrolysis. Now stop water circulation in the reflux condenser and increase the oil-bath temperature to 180 °C.

A-4.2 Distillation

Distil for about 60 minutes from the time the cooling water is stopped. The temperature of the distillation residue will be about 115 °C.

Disconnect the equipment and rinse the condenser dipping in the beaker with distilled water.

A-4.3 Titration

Add a few drops of methyl red indicator solution to the distillate in the beaker and titrate the excess acid with standard sodium hydroxide solution till the colour changes to yellow.

NOTE — The titration can also be carried out potentiometrically to a pH of 7.

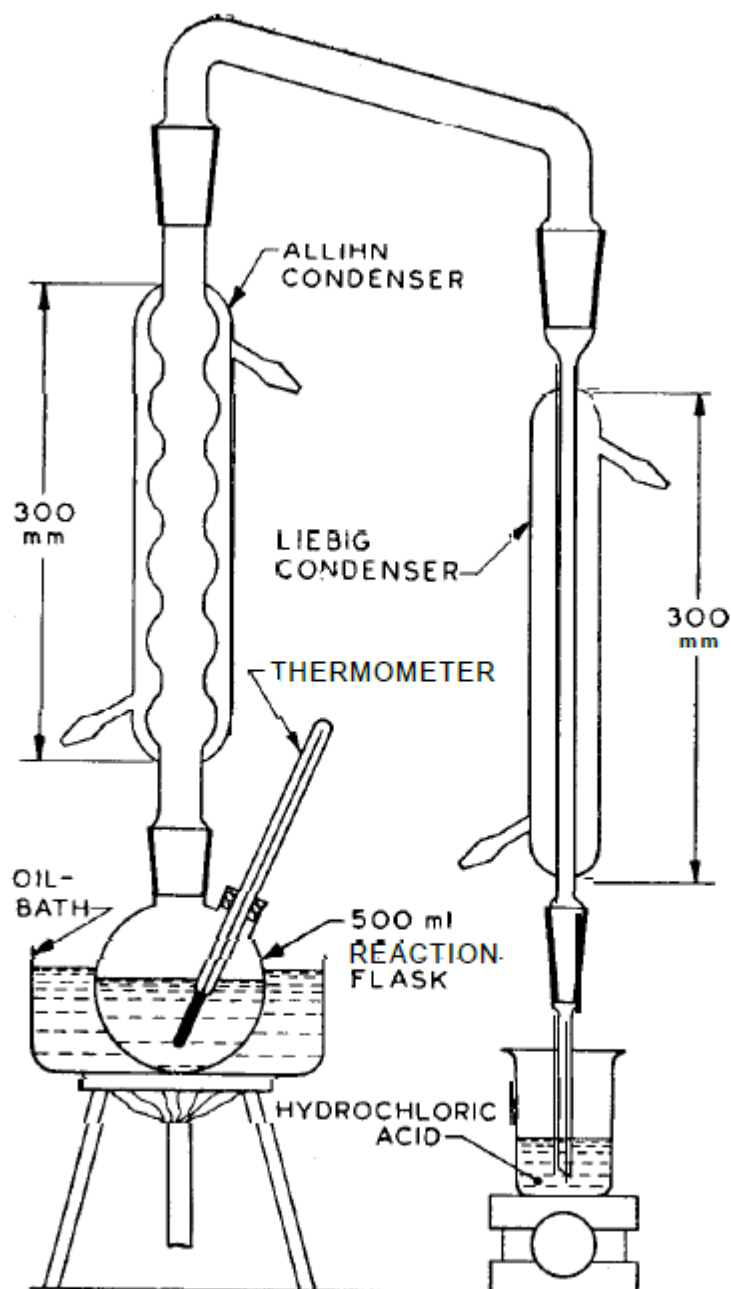


FIG. 1 APPARATUS FOR DETERMINATION OF FORMOTHION CONTENT

A-5 CALCULATION

Calculate the active ingredient content as follows:

$$\text{Formothion content, percent by mass} = \frac{(40 - V) \times N \times 25.7}{M}$$

where

V = volume in ml of standard sodium hydroxide solution used (see A-4.3),

N = normality of the standard sodium hydroxide solution, and

M = mass in g of sample taken for the test.

ANNEX B
(Foreword)

COMMITTEE COMPOSITION
Pesticides Sectional Committee, FAD 01

| <i>Organization</i> | <i>Representative(s)</i> |
|--|--|
| Directorate of Plant Protection Quarantine and Storage, Faridabad | DR RAVI PRAKASH (Chairperson) |
| All India Biotech Association, New Delhi | SHRI SAURABH SINGHAL SHRI SHAH JI DHAR (<i>Alternate</i>) |
| Central Insecticide Board and Registration Committee, Faridabad | SECRETARY DR VANDANA SETH (<i>Alternate</i>) |
| Central Insecticide Laboratory, Faridabad | DR ARCHANA SINHA SHRI SUBHASH CHAUDHARY (<i>Alternate</i>) |
| Consumer Guidance Society of India, Mumbai | SHRI SITARAM DIXIT DR M. S. KAMATH (<i>Alternate</i>) |
| Crop Care Federation of India, New Delhi | DR J. C. MAJUMDAR |
| Crop Life India, New Delhi | SHRI ASITAVA SEN MS NIRUPAMA SHARMA (<i>Alternate</i>) |
| CSIR - Indian Institute of Toxicology Research, Lucknow | DIRECTOR DR SHEELENDRA P. SINGH |
| FMC India Pvt. Limited, Bengaluru | SHRI CHIRAG PATEL |
| Food Safety and Standards Authority of India, New Delhi | ADVISOR (STANDARDS) |
| IDMA Laboratories Limited, Chandigarh | DR INDRA RAI |
| Indian Agricultural Research Institute, New Delhi | DIRECTOR |
| Indian Institute of Packaging, Mumbai | DR TANWEER ALAM |
| Indian Pest Control Association, New Delhi | SHRI UDAYAN GHOSH |
| Institute of Pesticide Formulation Technology, Gurgaon | DR M. VAIRAMANI |
| Ministry of Agriculture, Department of Agriculture, Chennai | JOINT DIRECTOR OF AGRICULTURE (RES.) DEPUTY DIRECTOR LAB (<i>Alternate</i>) |
| National Centre for Integrated Pest Management, New Delhi | DR SUMITRA ARORA |
| National Institute of Plant Health Management, Hyderabad | DR MAHESH SAINI MS T. SRIDEVI (<i>Alternate</i>) |
| Pesticide Manufacturers and Formulators Association of India (PMFAI), Mumbai | DR ARCHANA SRIVASTAVA DR UDAY KUMAR (<i>Alternate</i>) |

| <i>Organization</i> | <i>Representative(s)</i> |
|--|---|
| Regional Pesticides Testing Laboratory, Chandigarh | SHRI V. VASU |
| In Personal Capacity (4-6-90/2/8/2, Sri Devi Nilayam Tejaswinagar Coloni, Attapur, Hyderabad – 500048) | SHRI C. V. RAO |
| In Personal Capacity (263, Sector 28, Faridabad – 121008, Haryana) | SHRI VIPIN SAINI |
| BIS Directorate General | SHRIMATI SUNEETI TOTEJA, SCIENTIST 'E'/DIRECTOR AND HEAD (FOOD AND AGRICULTURE) [REPRESENTING DIRECTOR GENERAL (<i>Ex-officio</i>)] |

Member Secretary
SHRI KULDEEP MITTAL
SCIENTIST 'B'/ASSISTANT DIRECTOR
(FOOD AND AGRICULTURE), BIS

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This Indian Standard has been developed from Doc No.:FAD 01 (19527).

Amendments Issued Since Publication

| Amend No. | Date of Issue | Text Affected |
|-----------|---------------|---------------|
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